

REMARKS

By the present Amendment, Applicant proposes to cancel nonelected claims 3-6, 8, 10, 12, 14, and 16-20 and amend claim 2 to correct a minor informality. Upon entry of this Amendment, claims 1, 2, 7, 9, 11, 13, and 15 will remain pending and under examination.

In the Final Office Action identified above¹, the Examiner rejected claims 1, 2, 7, 9, 11, 13, and 15 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,994,762 to Suwanai et al. ("Suwanai") in view of Wolf et al. ("Wolf"), and further in view of U.S. Patent No. 6,770,977 to Kishida et al. ("Kishida"). Applicant respectfully traverses the rejection, because no *prima facie* case of obviousness is established.

The key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. Such an analysis should be made explicit and cannot be premised upon mere conclusory statements. See M.P.E.P. § 2142, 8th Ed., Rev. 6 (Sept. 2007). "A conclusion of obviousness requires that the reference(s) relied upon be enabling in that it put the public in possession of the claimed invention." M.P.E.P. § 2145. Furthermore, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art" at the time the invention was made. M.P.E.P. § 2143.01(III), internal citation omitted. Moreover, "[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences

¹ The Final Office Action contains a number of statements reflecting characterizations of the related art and the claims. Regardless of whether any such statement is identified herein, Applicant declines to automatically subscribe to any statement or characterization in the Final Office Action.

themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.” M.P.E.P. § 2141.02(I), internal citations omitted (emphasis in original).

“[T]he framework for the objective analysis for determining obviousness under 35 U.S.C. 103 is stated in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). . . . The factual inquiries . . . [include determining the scope and content of the prior art and] . . . [a]scertaining the differences between the claimed invention and the prior art.” M.P.E.P. § 214(II). “Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art.” M.P.E.P. § 2141(III). In this application, a *prima facie* case of obviousness has not been established because the Final Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the claimed invention and the prior art. Accordingly, the Final Office Action has failed to clearly articulate a reason why the prior art would have rendered the claimed invention obvious to one of ordinary skill in the art.

Independent claim 1 recites a combination including, in part, “a first insulating film formed above the semiconductor substrate and having a relative dielectric constant of 3.8 or less” and “a second insulating film covering the outer side face of the conductor and having a relative dielectric constant of over 3.8.” As explained in Applicant's specification², insulating films (low-k film) 12, 18, and 23, each having a relative dielectric constant of less than 3.8, are formed on one side of the conductor and an

² In making reference to the specification and drawings set forth herein, it is to be understood that Applicant is in no way intending to limit the scope of the claims to the exemplary embodiments shown in the drawings and described in the specification. Rather, Applicant expressly affirms that they are entitled to have the claims interpreted broadly, to the maximum extent permitted by statute, regulation and applicable case law.

insulating film 28 having a relative dielectric constant of over 3.8 is formed on the other side of the conductor. See paragraphs [0045], [0050], [0054], and [0057] for example. An exemplary structure resulting from the above description is shown in Fig. 2B.

The cited references, individually or in combination, fail to teach or suggest at least these elements of independent claim 1. The Examiner alleged that Suwanai discloses “a first insulating film 17/27 formed above the semiconductor substrate and having a relative dielectric constant” and “a second insulating film 20 covering the outer side face of the conductor and having a relative dielectric constant of over 3.8.” See Final Office Action at pages 2-3. The Examiner’s allegation is incorrect.

Fig. 11 of Suwanai, which was relied upon by the Examiner, shows a device including a wiring 18 formed within a first BPSG (boron-doped phospho silicate glass) film 17 and a silicon oxide film 27. See col. 7, line 66 to col. 8, line 4. The device of Suwanai further shows a second BPSG film 20 formed above the wiring 18, first BPSG film 17 and the silicon oxide film 27. See col. 8, lines 25-27. However, the first films 17/27 and 20, which allegedly correspond to the claimed first and second insulating films, respectively, are not formed on either side of the vertical portion of wiring 18. Instead, the films 17/27 cover both sides of the wiring 18.

The Examiner contended that although “Suwanai does not teach that the first insulating layer has a relative dielectric constant of less than 3.8,” Wolf teaches that “the interconnect delay can be reduced by using low k dielectric material (e.g. nanoporous silica (SiO₂) “ultra low”) having a dielectric constant of less than 2.0 (pgs. 791-795).” See Final Office Action at pages 3-4. The Examiner then alleged that “[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to use

a low k dielectric material (e.g. nanoporous silica SiO₂) having a dielectric constant of less than 2.0 for the first dielectric layer disclosed by Suwanai.” See Final Office Action at page 4. Applicant respectfully disagrees.

The combination of Suwanai and Wolf does not teach or suggest the claimed device. That is, even if the nanoporous silica SiO₂ of Wolf could be used as the first BPSG/silicon oxide film 17/27 of Suwanai, and Applicant does not agree that it can, the resulting device would still not teach or suggest the claimed device. As noted above, the claimed device includes a first insulating film having a relative dielectric constant of less than 3.8 and a second insulating film having a relative dielectric constant of over 3.8 are formed on either side of the conductor. In contrast, the structure taught by the combination of Suwanai and Wolf would have a nanoporous silica SiO₂, having a dielectric constant of less than 2.0, formed on either side of the wiring 18, and a BPSG film having a relative dielectric constant of over 3.8 formed above the wiring 18 and the nanoporous silica SiO₂. For at least this reason, Wolf does not compensate for the deficiencies of Suwanai.

The Examiner further applied Kishida because it alleged teaches “a barrier layer 202/203 composed [of] tantalum nitride/tantalum is formed on an outer surface [of] a conductor layer.” See Final Office Action at page 4. However, even assuming that Kishida provides these teachings, which Applicant does not concede, Kishida also fails to teach or suggest the claimed device in which a first insulating film having a relative dielectric constant of less than 3.8 and a second insulating film having a relative dielectric constant of over 3.8 are formed on either side of the conductor. Accordingly, Kishida does not compensate for the deficiencies of Suwanai and Wolf.

In view of the deficiencies of the references discussed above, the Final Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, the Final Office Action has failed to clearly articulate a reason why independent claim 1 would have been obvious to one of ordinary skill in view of Suwanaj, Wolf, and Kishida. Therefore, a *prima facie* case of obviousness has not been established. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 1, 2, 7, 9, 11, 13, and 15 under § 103(a).

Applicant respectfully requests that the Examiner enter this Amendment under 37 C.F.R. § 1.116, placing the pending claims in condition for allowance. Applicant submits that the proposed amendments of the claims do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, and should allow for immediate entry by the Examiner. Therefore, entry of this Amendment and a timely issuance of a Notice of Allowance are earnestly requested.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account No. 06-0916.

Respectfully submitted,

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By: _____



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